

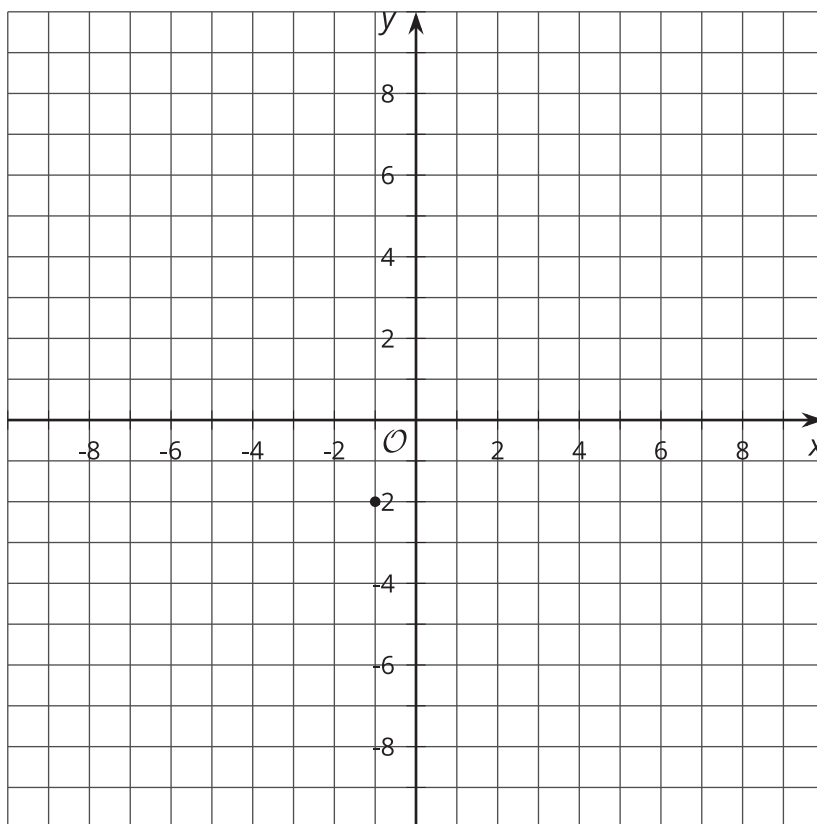


Connecting Distance and Circles

Let's look at points a given distance away from a particular point.

1.1 A Distance Away

Plot as many points as you can that are a distance of 5 away from the point $(-1, -2)$.

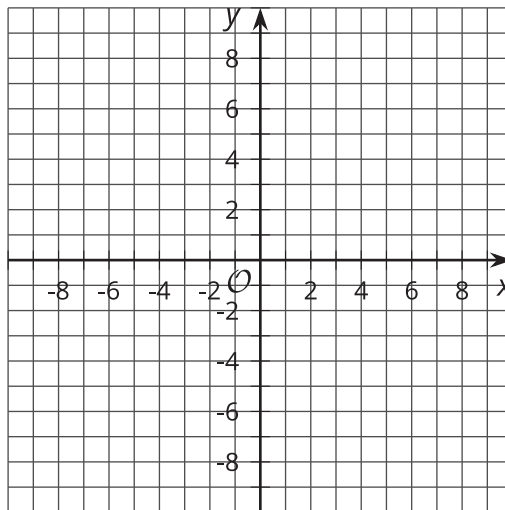


1.2 Plot a Distance Away

Here is a list of points.

$(0, 8.5)$ $(0, -6.5)$ $(-10, 0)$ $(2.5, 6)$ $(6, 8)$ $(-4, -7.5)$ $(-4, 7.5)$ $(-6, -8)$ $(-2.5, -6)$
 $(7.5, 4)$ $(8, 6)$ $(-6, 2.5)$ $(-6, -2.5)$ $(-8, 6)$ $(7.5, -4)$

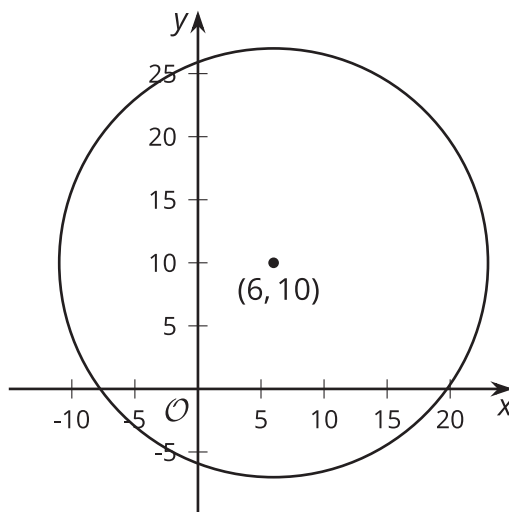
- Sort the points according to their distance from the origin.
- Your teacher will assign you to work with the points that are 6.5 units, 8.5 units, or 10 units from the origin.
 - Plot the points on the coordinate plane.



- Find at least 2 more points the same distance from the origin that do not lie on either the x - or y -axis, and plot them on the plane.
- Use a compass to draw a circle centered at the origin with a radius that is the same as the distance you were assigned.

1.3 Circling the Problem

The image shows a circle with its center at $(6, 10)$ and radius of 17 units.



1. The point $(14, 25)$ looks like it might be on the circle. Verify if it really is on the circle. Explain or show your reasoning.
2. The point $(22, 3)$ looks like it might be on the circle. Verify if it really is on the circle. Explain or show your reasoning.
3. In general, how can you check if a particular point (x, y) is on the circle?



Are you ready for more?

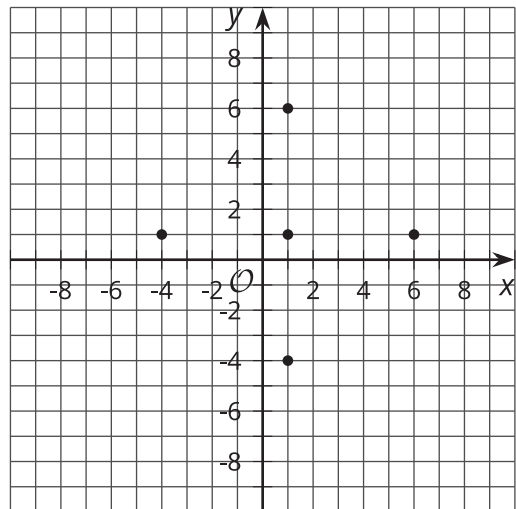
Circle P has a center at point P at $(-4, 4)$ and a radius of 5. Circle Q has a center at point Q at $(2, 4)$ and a radius of 5.

1. Graph the circles. Include points P and Q .
2. Draw the perpendicular bisector of PQ .
How do you know it is the perpendicular bisector?
3. Find the points of intersection of the circles.

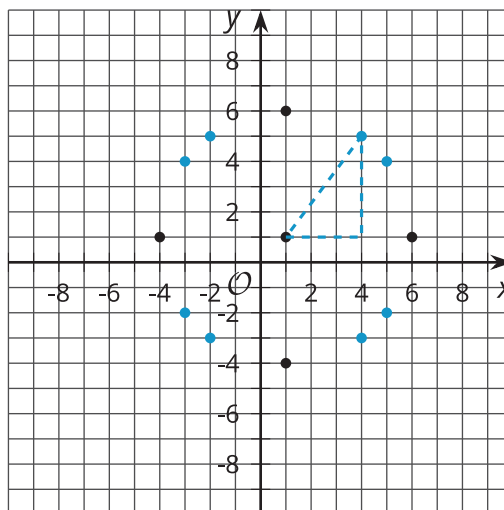


Lesson 1 Summary

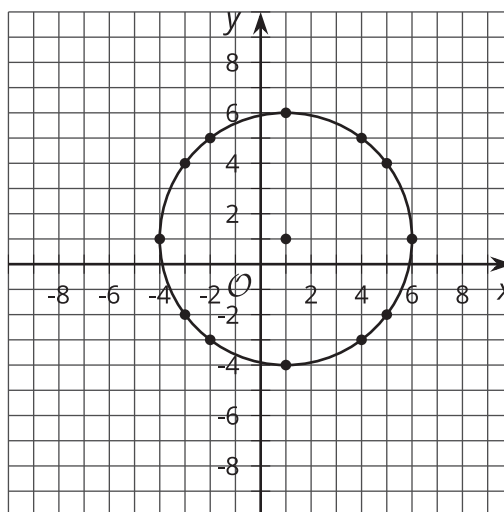
Let's find some points that are a distance of 5 away from the point $(1, 1)$ and plot them on a grid. We can use gridlines to find 4 points:



We can use the Pythagorean Theorem to help us find some more points. Recall that for a right triangle with a hypotenuse of 5, we can make a right triangle with legs 3 and 4. This means that if the horizontal and vertical distances between the points are 3 and 4, then the distance between them will be 5. We can find 8 more points this way!



As we fill in more points, it looks like the points are forming a circle around the point $(1, 1)$, and in fact, they are. The circle has a radius of 5, which makes sense since we know that a circle is the set of all points a given distance away from a central point. In this case, that given distance is 5.



How can we check whether a point lies on this circle if we are not sure? Let's check the point $(3, -3.5)$. We can use the Pythagorean Theorem to test the distance between the center of the circle and the point: $\sqrt{(3 - 1)^2 + (-3.5 - 1)^2} = 4.38$, which is not equal to 5. That means the point is close to the circle, but does not lie on the circle.

We can say that for a circle of radius r and center C , if a point P is a distance of r away from C , it will lie on the circle. If point P is not a distance of r away from C , then it will not lie on the circle. Another way to say this is that for a circle of radius r and center C , P will lie on the circle if and only if it is a distance of r away from C .